

# Pacific Ranges and Facilities

China Lake and Point Mugu, California



NAVAL AVIATION SYSTEMS

**TEAM**



Developing and operating major land, sea,  
and air ranges; test facilities; and associated  
threat environments for use by government  
agencies, allied countries, and private industry.

## WELCOME



Welcome to the Pacific Ranges and Facilities, a national range complex and one of the premier test and training locations in the Department of Defense. This brochure acquaints you with our land, sea, and air ranges and provides points of contact for follow-up.

Our ranges have been serving the Navy, DOD, and industry for more than half a century. Our people possess the highest levels of professional education, specialized training, and hands-on experience. The addition of new facilities and the development of additional capabilities keeps us at the cutting edge of test and training technologies. Because we continuously improve our processes, instrumentation, and support functions,

we can guarantee our customers the highest level of service, the maximum operational security and safety, and the most economical price.

Additional information is available at our Web site

**<http://www.nawcwpns.navy.mil/~pacrange/>**

We welcome further inquiries into any aspect of our operations that may benefit your organization.

Sincerely,

A handwritten signature in black ink that reads "A. K. Rogers". The signature is written in a cursive, flowing style.

A. K. Rogers



## LAND RANGE

NAWCWD's 1,700-square-mile Land Range is the Nation's premier site for test and evaluation of conventional air and ground weapons, aircraft systems, and parachute systems and for training and tactics development. Comprehensive state-of-the-art instrumentation includes photo-optical and telemetry systems; radar, video, laser, and global positioning system tracking systems; command-and-communications systems; and meteorological data acquisition and distribution systems.

The Land Range conducts day and night operations and accommodates live high-explosives testing (up to 500,000 pounds net explosive weight). In the northern portion of the Range lie the rugged Coso Mountains, which are used for military training and tactics development.



Airspace over the Land Range is restricted from surface to infinity. Surrounding lands are overlain by the R-2508 restricted airspace complex (20,000 feet to infinity), which centers on the Land Range and covers an area larger than the state of Maryland. The restricted airspace, with year-round ideal flying weather, combines with the surrounding desert to ensure safe, secure, air- and ground-range operations.

Simultaneous operations can be scheduled on multiple air test ranges, multiple ground test ranges, specialized test areas, ordnance test facilities, and control and support facilities. In addition, the Land Range features a fully equipped airfield with runways up to 10,000 feet in length; targets (both fixed and mobile), including the Nation's largest array of "shootable" RF targets for antiradiation missile testing; missile- and drone-launching facilities; high-speed test tracks; and ranges for exterior ballistics, antiship missile defense, large- and small-caliber guns, and antitank weapons.

For longer range weapon testing or theater-level scenarios, NAWCWD's Land Range can be connected with the Electronic Combat Range and (via the IR-200 flight corridor) with the Sea Range.

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**For more information, contact**  
**Rob Ostrom, Range Management Division, (760) 939-6034**

## SEA RANGE



The Sea Range comprises 36,000 square nautical miles of highly instrumented, controlled sea surface and airspace. The Range can be expanded north to Big Sur, south to the U.S./Mexico border, and west into the broad Pacific Ocean to include 196,000 square nautical miles.

An extensively instrumented, large-scale, open-air range, the Sea Range supports the DOD's most complex test and training operations in a realistic marine environment. The Range has an extensive array of aircraft; fixed and mobile seaborne targets and aerial targets, such as remotely piloted full-scale aircraft; and threat simulation and test and evaluation laboratories that include the latest modeling-and-simulation capabilities.

The Sea Range supports a variety of test and training scenarios, from routine one-on-one engagements to complex multiparticipant, multitarget operations in dense electronic-combat environments with multiservice, multinational forces. The Range also hosts complex, full-battle-group Fleet exercises involving aircraft, surface ships, and submarines against a variety of targets and threats. All operations are conducted in a realistic and controlled environment.

Sea Range resources include waterfront facilities that open to a large ocean area for overwater missile tests, and offshore islands—including San Nicolas Island, 65 miles from the mainland—for placement of extended-range instrumentation. Laguna Peak, elevation 1,500 feet, is one of the mainland sites hosting instrumentation for extended line-of-sight coverage over the Sea Range. Port Hueneme, a deepwater port, is immediately adjacent to the Sea Range. Excellent climate and weather conditions on the Sea Range permit unrestricted operations year round.

**For more information, contact  
Randy Langham, Range Management Division, (805) 989-8801**



## ELECTRONIC COMBAT RANGE

The Electronic Combat Range (ECR) provides an open-air test range at which customers can test aircraft, airborne systems, and techniques designed to sense, counter, or penetrate threat air-defense systems. The Range, spread across the floor of an isolated 15-mile-long valley bordered by mountains to the north and south, covers 825 square miles of Navy land beneath 1,200 square miles of airspace that is restricted from surface to infinity. This region was selected for its remoteness and absence of population and offers high security with minimum electromagnetic interference from test operations or other military or civilian communities. The ECR does not compete for land or airspace with other test facilities and is equipped to support testing up to the top-secret and special-access levels.

ECR supports all types of airborne electronic combat testing, tactics development, and training. Multiple threat systems—actual, surrogate, and simulated—use a broad range of technologies, including pulse systems, continuous wave systems, pulse Doppler systems, multispectral systems, and Blue and Gray systems. Tests can be conducted against emitters in spectrums that include IR, RF, electro-optical, millimeter wave, and laser.



ECR's instrumented command-and-control system can coordinate an integrated air defense network. All systems have at least audio and video instrumentation, and many are instrumented to collect extensive digital data. Other instrumentation and data services include time, space, position information; global positioning system; telemetry; weapons simulations; measures of effectiveness; RF monitoring and spectrum analysis; radar cross section as seen by the threat; tailored video; real-time data display; and extensive posttest (off-line) data products.

This is the only DOD electronic-combat range at which customers can test against naval air defense systems and combinations of land and naval systems (the littoral threat) either individually or as part of an integrated air defense system.

**For more information, contact  
Ron Stepp, Electronic Combat Range, (760) 939-9197**

## ORDNANCE OPERATIONS

The Ordnance Test Complex at NAWCWD comprises five major geographic test areas with 22 separate sites and bays. The Complex conducts a full spectrum of propulsion, warhead, environmental, insensitive munitions, and other ordnance tests. Assembly and storage buildings are also available.



Solid propulsion systems—from the smallest motors and gas generators to rocket motors with 1 1/2 million pounds of thrust—are static fired. The complex has the most comprehensive high-hazard propulsion testing capability in the U. S.

X-ray inspection, including high-energy computed tomography and real-time radiography, is available for items ranging from small arms ammunition to rocket motors of ICBM size.

The Aeroheat Test Facility (T-Range) is a high-pressure air blowdown facility capable of simulating variable Mach number and altitude flight conditions for materials characterization and testing of tactical-sized missile components and airbreathing propulsion systems. The facility is supported by experts in computational fluid dynamics and thermal and structural analysis.

The Environmental Test Complex is used to gather, analyze, interpret, and report environmental data through temperature, humidity, salt spray, shock, vibration, rain, and solar testing. Hazard assessment and classification testing includes fast and slow cookoff, bullet and fragment impact, sympathetic detonation, and 40-foot drop tests.

Instrumented facilities are available for laboratory-scale research and for tests involving up to 20,000 pounds of explosives. Fuel-air explosive tests of up to 2,000 pounds of fuel are performed at a facility equipped with 180-foot test-article suspension towers and high-speed photography equipment.

Developmental and operational bombs and warheads are subjected to Joint Munitions Effectiveness Manual arena tests.

The Ordnance Test Complex's newest facility is the Plume Measurement Facility, where rocket-motor plumes are measured and characterized with IR, UV, EO, and radar.

**For more information, contact**

**Dennis Sorges, Ordnance Operations, (760) 939-7252**

## JUNCTION RANCH RANGE

Junction Ranch Radar Cross Section (RCS) Range is located in a remote desert valley on the Land Range. The facility, which is surrounded by mountains, provides precision outdoor RCS measurements of models and real targets, including air, ground, and sea vehicles; very low observables (VLO); ship models and components; missiles; tactical ballistic missiles; reentry vehicles; ground vehicles; and plumes. The facility is also used to measure antenna patterns and to develop state-of-the-art capabilities in radar, software, and VLO target supports.

Junction Ranch's isolated location allows low-frequency testing in a highly secure and RF-interference-free environment. RCS measurements have been taken at 40 MHz. The Ranch's two primary ranges—the Lookdown Range and adjacent Horizontal Range—employ multifrequency radars that produce a wide range of RF band, pulse-repetition frequency, and pulse-width combinations. Step-chirp waveforms provide high-range resolution and inverse synthetic aperture radar imaging. The Horizontal Range can perform coherent bistatic measurements and features a 40-foot-high, low-backscatter stationary pylon that holds and rotates targets weighing up to 5,000 pounds.

Either range can be staffed for multishift operations. Instrumentation can be "fine-tuned" for unique data needs, and test data can be supplied in formats including global, imaging, swept frequency, and pen plots, such as medians, cumulative probability, and polar/rectilinear RCS. Facilities for assembly, modification, and temporary storage of radar target models are available at both ranges.

Junction Ranch also has four ground ranges that provide low-cost, secure support for acoustic, dust-suppression, laser radar (LADAR), IR, UV, millimeter-wave, air-to-ground, and ground-to-air testing. The Ranch is also equipped for high-power transient electromagnetic measurements and



global positioning system jamming tests. A mobile Doppler radar for plume measurements can be used on site or transported to a customer-specified location.

**For more information, contact**

**Rob Ostrom, Range Management Division, (760) 939-6034**



## SLED TRACK TESTING



The Supersonic Naval Ordnance Research Track (SNORT) combines many aspects of laboratory testing with the dynamic conditions of free-flight testing. Sled track testing has the added advantage of test-item recovery for posttest examination or retest.

Tests run on the 4-mile-long, dual-rail, precision-aligned track can achieve speeds up to Mach 4 and carry payloads up to 136,000 pounds. The track incorporates a recirculating water brake in its final 2 miles. A simulated rain field along a 2,500-foot section of SNORT allows testing to determine the effects of rain erosion on radomes or other test items. Sledborne and trackside optical and electronic instrumentation provide data. A wide variety of sleds, propulsion techniques, and targets

are available; however, track personnel can also design and build custom sleds or targets to customer specifications.

The SNORT Complex also includes the G-4 Terminal Ballistics Track. G-4 is a narrower gauge, 3,000-foot-long track inclined at a constant grade of 2.8%. Even though G-4 is a shorter track, speeds up to Mach 4 and accelerations approaching those at SNORT can still be achieved. The muzzle of the dual-rail track overlooks a wide, deep valley that enables ballistic launch trajectories several hundred feet above impact point.

Other SNORT test facilities include the Stationary Test Facility, a fixed-position stand used to test items with limited ordnance, such as aircraft ejection seats; the Aerial Launch Facility, a 45-degree, free-flight launch capability for specially designed monorail sleds; and the Vehicle Barrier Track, used to evaluate the effectiveness of antiterrorist vehicle barricades. A typical Vehicle Barrier Track test accelerates a 20,000-pound vehicle to 50 mph and rams a barricade.

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**For more information, contact**

**Rob Ostrom, Range Management Division, (760) 939-6034**



## AIRCRAFT ASSETS



Aircraft support is provided by Naval Weapons Test Squadrons at China Lake and Point Mugu, which together make up the Naval Test Wing Pacific. Pilots and aircrews are experienced in dealing with complex test and training scenarios, and the test aircraft can be modified to accommodate a wide variety of developmental weapons and systems.

Aircraft types (and quantities) available to our customers include:

**AH-1W Cobra.** (1) An inexpensive rotary-wing platform for test and training missions, including autonomous and cooperative laser designation, forward-firing ordnance and 20-mm cannon, seeker tracking profiles, and low-altitude target presentations.

**AV-8B/TAV-8B Harrier.** (5) Equipped with camera-instrumented gun pod, a gun ammunition pack equipped with data recorders, over-the-shoulder cockpit video with telemetry, and laser reflectors for ALRITE laser position tracking.

**DC-130 Hercules.** (3) Serves as launch platform for BQM-34 and BQM-74 aerial targets and provides test-range logistics support throughout the country.

**F-14 Tomcat.** (5) Delivers conventional air-to-air and air-to-ground ordnance and decoy expendables and can carry airborne control pods.

**F/A-18 Hornet.** (13) Performs developmental, verification, and validation flight testing for F/A-18 specific and nonspecific projects.

**HH-1N Iroquois.** (3) Used for search and rescue, parachute test and evaluation, equipment transport, radar target, photo/test equipment platform, range tours, and range support.

**NP-3D Orion.** (5) Uses Cast-Glance imaging suite, advanced command transmitter system, and billboard phased-array telemetry system to support Sea Range testing and missile tests worldwide.

**QF-4N/S Phantom II.** (14) Used in manned and unmanned configurations for multisensor search and track, dynamic target presentations, forward-firing and free-falling ordnance, photo/safety chase, and electronic airborne jamming.

**SA-227 Metroliner III.** (4) Makes daily shuttle flights (cargo and passenger) between Point Mugu and China Lake.

**T-39 Sabreliner.** (1) Uses a mounting rack in the radome for captive flight testing of seekers, fuzes, radars, and other systems that require a versatile, quick-moving platform.

**For more information, contact  
the Range Management Division**

## THREAT AND TARGET SYSTEMS



NAWCWD, through the Threat/Target Systems Department, offers customers a comprehensive selection of threats and targets. A highly skilled technical workforce develops, tests, evaluates, and provides life-cycle support for the threats and targets and oversees their use during test and training exercises.

**Aerial targets** include towed targets, subscale subsonic targets, full-scale

missile targets, and full-scale aircraft targets capable of remote operation by an air- or ground-based controller.

- TDU-34B/A and TDU-32 (full-scale towed targets)
- BQM-74E and BQM-34S (subscale subsonic missiles)
- AQM-37C (subscale supersonic missile)
- Vandal and MA-31 (full-scale supersonic missiles)
- QF-4N/S (full-scale supersonic aircraft)

**Land targets** include a broad selection of fixed, mobile, and antiradiation targets. Targets are also constructed to meet specific program requirements.

**Seaborne targets** include littoral and open-ocean targets.

- High-Speed Maneuverable Surface Target (40+ knots, can operate independent of ranges with a portable command-and-control unit)
- QST-35 Seaborne Powered Target (SEPTAR) (missile-launch threat)
- Mobile Ship Target (full-scale, remotely controlled, environmentally friendly)
- Aerial Target Launch Ship (full-scale vessel for remote launches of selected aerial targets)
- Improved Surface Tow Target (sled for direct-fire scenarios, towed by remote SEPTAR)
- Trimaran and Williams Sled (missile/gunnery target)
- Floating At-Sea Target (FAST) (gunnery/bomb target)
- HARM/IR Target (drifting barge target)

Augmentation and simulation systems used with the targets include electronic countermeasures systems (i.e., active jammers, chaff, and flares) and radar simulator systems. These systems complete the threat electromagnetic environment provided by the target vehicles.

Related capabilities include scoring (scalar and vector); collection of radar and IR signatures; target command-and-control; and location, navigation, and identification services.

**For more information, contact  
the Range Management Division**

## TEST ARTICLE PREPARATION

A host of range instrumentation services—radar, photo-optical, video, laser, bomb scoring, and the like—ensure that critical data from weapons testing are properly gathered and recorded. Often, securing the necessary data also requires special preparation of the test item itself. At NAWCWD, this service is provided by the Test Article Preparation Department.

The organization provides whatever test-article hardware and software is needed—off-the-shelf or custom designed—to meet the data requirements. Engineers and technicians design, develop, specify, document, build, procure, integrate, encrypt, install, test, evaluate, calibrate, configure, operate, repair, and maintain the test article's instrumentation, telemetry, and flight-termination systems.

Tactical Air (TACAIR) instrumentation support is provided for naval aircraft that test on the NAWCWD ranges. Highly accurate weapons/stores separation data are obtained with high-speed motion picture film. Photogrammetry is used to measure separating stores relative to time, space, the aircraft, and the six degrees of freedom encountered during separation by the store. This service is provided by lens calibration, targeting the launch platform and the store, and time-tagging all images to the millisecond level.

Specialists in warhead-compatible telemetry are adept at designing systems that fit into unused spaces in weapons. Telemetry systems that will eventually transition to production (e.g., the Standard Missile telemetry system) are designed for low-cost and producibility.

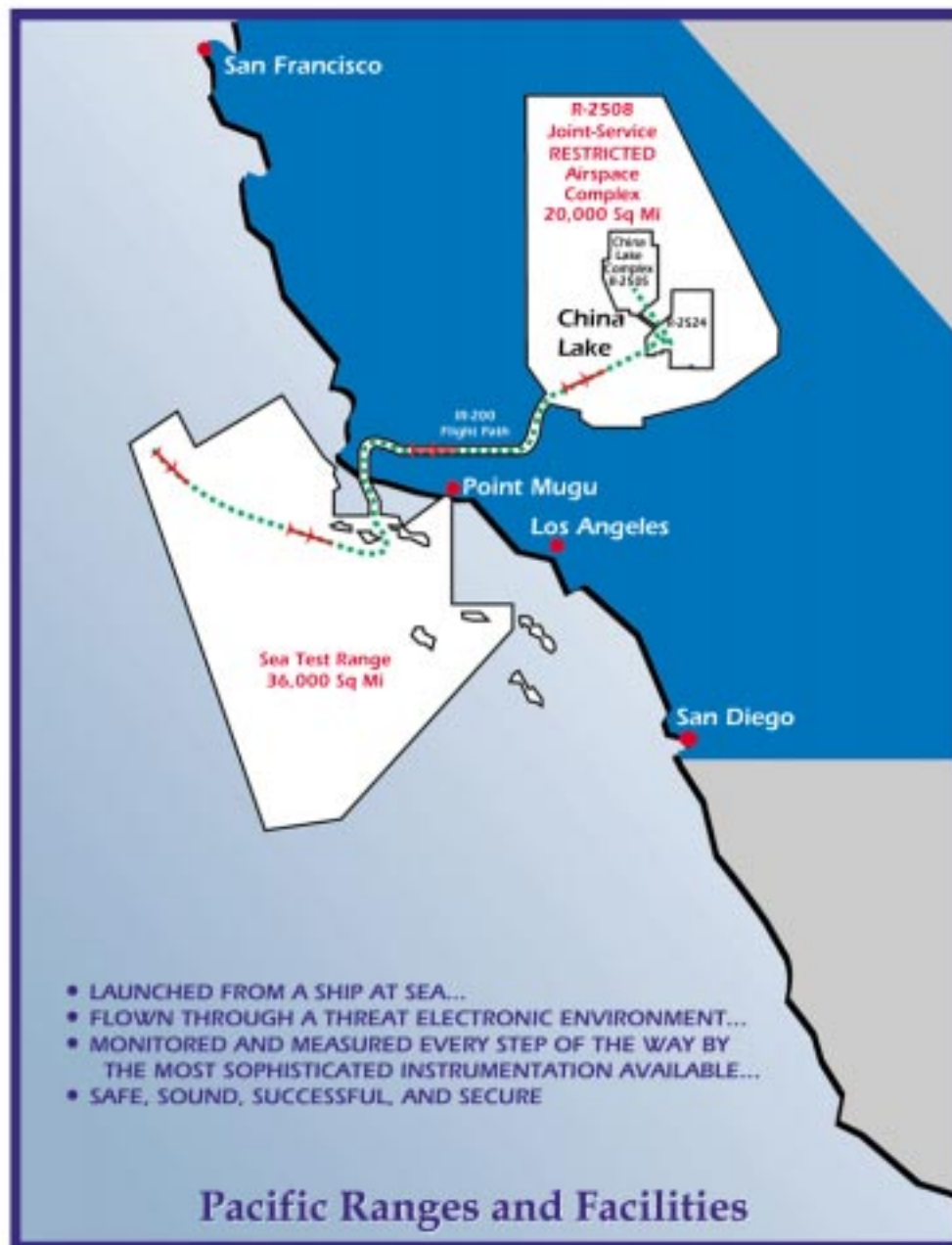
Secure video compression technology, such as the IRIG-STD-210-93 compression encoder HORACE, is another area of expertise. Department engineers have developed a technique to retain measurement-quality video during compression.



Rounding out the test-article preparation services are a world-class antenna development laboratory and a sophisticated fabrication capability that supports quick-turnaround telemetry needs and demonstrates the producibility of designs before they transition to production.

**For more information, contact the range whose services are of interest to you.**





<http://www.nawcwpns.navy.mil/~pacrange/>

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